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Global Value Chains and the Governance of 'Embedded' Food Commodities: The Case of Soy

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Abstract

In recent decades, soy has emerged as one of the world's most significant food-related commodities and is strongly linked to deforestation and habitat loss, especially in Latin America. However, only a very small proportion of soy is consumed directly as food by humans with the rest crushed to produce animal feed, oils, biofuel and other industrial products. We argue that the peculiar (but not necessarily unique) structural and institutional characteristics of the soy supply chain raises crucial questions about the promotion of sustainability in complex, non-consumer facing global value chains (GVCs). The particular way that soy is 'embedded' in the food system has meant that consumer-facing firms have been shielded from the externalities of its production and trade to a much larger degree than is the case for comparable food commodities. This, in turn, helps to explain the widely perceived inadequacies of the private certification of 'sustainable soy' – and ongoing and wider political struggles around land, labour and the environment – for more comprehensive and inclusive forms of governance.

This Special Issue deals with the most widely debated aspect of the global value chain (GVC) framework: that is, the appropriation of the term 'governance' and the various ways that this is conceptualised and applied to different cases (Eckhardt and Poletti, 2018). In this article, we contribute to this debate through a specific focus on agrifood GVCs. Although agrifood has figured prominently in the GVC literature, the dominant tendency has been to focus on the power of major retailers to control supply chains through the use of private standards, thus determining the conditions in which upstream suppliers participate in these chains (Dolan and Humphrey, 2000; Fold, 2002; Henson and Humphrey, 2010; Henson and Reardon, 2005; Ponte, 2009; Tallontire, 2007). We aim to contribute to a growing literature that looks beyond these questions to consider the broader structural and institutional context in which agrifood GVCs are situated. We examine how this context shapes, not just the creation and distribution of economic value, but wider issues of social and environmental sustainability, transparency and democratic control (Fold, 2002; Lee et al., 2012; Ponte, 2009).

To analyse the governance of agrifood GVCs, we focus on the specific case of soy. In recent decades, soy has emerged as one of the world's most significant agro-commodities and is strongly linked to deforestation and habitat loss, especially in Latin America, which is now responsible for close to 60 per cent of global production (USDA, 2015). Crucially, only 6 per cent of soy is consumed directly as food by humans (mainly in Asia) with the rest crushed to produce animal feed, oils, biofuel and other industrial products (WWF, 2014). This 'embedded' character means that the

intensity and extensity of soy production and trade is often understated in official statistics, and lacks visibility from a consumer perspective. Soy also belies the linearity implicit in standard GVC models, where in this case powerful agro-chemical companies (e.g. Monsanto, Syngenta and Dupont) and trading houses (e.g. ADM, Bunge, Cargill and Louis Dreyfus) are located upstream of the major retailers, with whom ultimate power is often thought to lie. Finally, the role of soy in changing land use in Latin America has meant that the sector has proven to be a lightning rod for social and political struggles over land use, labour and community rights, and environmental justice (Gibbs et al., 2015; Lima et al., 2011; Oliveira and Hecht, 2016).

In the article, we map and analyse the governance of the GVC for soy and the role of different structures, institutions and actors therein. We begin with a critical engagement with the relevant GVC literature and the key concept of governance. We then turn to our case study and ask what are the main characteristics of the soy GVC and how do these correspond to established models of GVC governance. We argue that the peculiar (but not necessarily unique) structural and institutional characteristics of the soy supply chain raise crucial questions about the promotion of sustainability in complex, non-consumer facing GVCs. The particular way that soy is embedded in the food system has meant that consumer-facing firms have been shielded from the externalities of its production and trade to a much larger degree than is the case even for analogous commodities like palm oil. Although palm oil has a similarly complex life cycle to soy, a key difference is that the former is normally listed on

food labels as a product ingredient and hence is more visible to consumers. Thus, even more than palm oil, the embedded character of soy is a key to understanding the widely perceived inadequacies of the private certification of 'sustainable soy' in the search for more comprehensive and inclusive forms of governance (Gibbs et al., 2015; Lima et al., 2011; Oliveira and Hecht, 2016).

The governance of GVCs

Gereffi (1994) was the first to use the term governance (at least in the sense it is now deployed by the majority of GVC researchers) in his influential contribution to *Commodity chains and global capitalism* (Gereffi and Korzeniewicz, 1994). Here, Gereffi (1994, p. 97) defined governance as the 'authority and power relationships that determine how financial, material and human resources are allocated and flow within a chain'. On this basis, Gereffi distinguished between 'producer-driven' and 'buyer-driven' chains and argued that barriers to entry constitute the key determinant of the 'governance structure' of these chains. In a subsequent article (Gereffi et al., 2005), the buyer/producer-driven dichotomy was supplemented with a five-fold typology, ranging from market-based to modular, relational, captive to hierarchical GVCs. Gereffi et al. (2005) argued that the governance structures prevailing in different GVCs is a function of: (1) the *complexity* of information and knowledge transferred between lead and subordinate firms in the chain; (2) the extent to which this information and knowledge can be *codified*; and (3) the *capabilities* of these subordinate firms in relation to the requirements of lead firms. As Ponte and Sturgeon (2014) describe it, the key distinction between Gereffi's original buyer and producer-driven GVCs model and the subsequent five-fold typology lies in the different way in which governance is conceptualised: whereas the former conceptualises governance as 'driving' the latter sees it in terms of 'linking'. Ponte and Sturgeon (2014) also refer to a third conceptualization: governance as 'normalising', which refers to the application of 'convention theory' to GVC analysis (Gibbon and Ponte, 2005; Gibbon et al., 2008; Ponte, 2009) to capture the ways in which lead firms are able to realign 'a given practice to be compatible with a standard or norm'.

Private standards and the governance of agrifood GVCs

In the same way that GVCs have emerged as the key analytical framework for understanding contemporary forms of global trade and production, private standards have emerged as the key analytical framework for understanding the governance and regulation of these GVCs. In the specific case of agrifood, standards in general are said to perform three different functions: (1) as a mechanism by which public or private authorities regulate the food system; (2) as a mechanism for satisfying consumer demand for high quality food that is safe to eat and/or meets certain ethical or environmental standards; and (3) a mechanism for differentiating food products in contemporary food markets (Henson,

2008; Henson and Reardon, 2005; Humphrey, 2008). For GVC governance theory, standards allow for the codification of commodity, resource and information flows between firms in complex supply chains, specifying the nature of different food products, how they are produced, processed and transported, and by whom (Henson, 2008; Henson and Reardon, 2005; Humphrey, 2008). In Henson and Humphrey's (2010) schema, agrifood standards can be distinguished, not just according to whether they are overseen by public or private authorities, but also according to whether they are mandatory or voluntary. Hence, food standards can be based on one of four different combinations: (1) mandatory public standards or regulations; (2) voluntary public standards, that is, standards created by public bodies but adopted voluntarily by private actors; (3) legally mandated private standards, that is, standards created by private actors but later made mandatory by public bodies; and (4) voluntary private standards, that is, standards created, adopted and overseen by private actors.

For GVC governance theory, then, the critical question is why do these standards emerge and what explains the form they take and the effectiveness or otherwise of these standards once implemented? Mayer and Gereffi (2010) hypothesise that private governance is most likely to be forthcoming and effective in the presence of buyer-driven GVCs in which lead firms enjoy considerable leverage over upstream suppliers but whose brand reputation is potentially vulnerable to social activism, media exposés and consumer boycotts. Lee et al. (2012), similarly, point to the type of lead firm and the degree of market concentration in a given GVC as the key determinants of the adoption and implementation of enhanced standards. They note, however, that buyer-driven chains are not necessarily the norm in agrifood GVCs. Sectors like bananas, coffee and pineapples, for example, are classified as 'bilateral oligopolies' because of the ways in which economic power is concentrated at *both* the production and retail stages of the chain. Rueda et al. (2017) reach a similar conclusion but on the basis of a more systematic typology. They argue that the type of instruments chosen by companies (measured according to both stringency and scope) is determined by three conditions: (1) the environmental pressures and opportunities in respect of the sourcing of raw materials; (2) the firm's overall position and therefore potential leverage in the value chain; and (3) the marketing opportunities available to downstream firms for certification or other forms of product differentiation. In the case of soy, Rueda et al. focus on Cargill's decision to sign the Soy Moratorium, prohibiting the use of soy grown on lands deforested after July 2006. The moratorium, they suggest, was signed because it satisfied conditions (1) and (2) but not (3). That is to say, Cargill's large market share and high level of control over its suppliers (due to its dominant position in processing, distribution and logistics) enabled it to respond to NGO pressure by making a *credible* commitment in signing the soy moratorium. By the same token, the homogeneous nature of soy as a commodity meant that the potential for product differentiation on the basis of quality was negligible (Mayer and

Gereffi, 2010; Rueda et al., 2017). This, coupled with the low level of consumer recognition of the Cargill brand, explains why the firm did not necessarily feel the need to communicate its decision to sign the soy moratorium to downstream consumers. What these conclusions do not necessarily explain, however, is why Cargill, alongside other large agro-processing firms, also opted to participate in the Roundtable on Responsible Soy (RTRS) certification scheme, which in many ways can be seen as a consumer-facing initiative that, at least to a degree, has sought to differentiate soy on the basis of quality attributes. These aspects of the governance of soy are part of our case study analysis, to which we now turn.

The case of soy

Soybean has become one of the world's rapidly expanding soft commodities, with global production increasing from 27 m tonnes in 1961 to 335 m tonnes in 2016. This growth has been especially dramatic in the last decade, in which time production more than doubled (FAO, 2018). While used in oils, biofuel and other industrial products, global demand for soy has been driven primarily by its use as animal feed (WWF, 2014). Soy production is heavily concentrated in a handful of countries, with the US (117 m tonnes in 2016 – 35 per cent of global production – up from 75 m tonnes in 2000), Brazil (96 m tonnes in 2016 – 28.8 per cent of global production – up from 33 m tonnes in 2000) and Argentina (59 m tonnes in 2016 – 17.6 per cent of global production – up from 20 m tonnes in 2000) being the largest producers (FAO, 2018). The rapid expansion of soy production in Latin America, in particular, has been associated with extensive land use change and soy is now marked as a major driver of deforestation in the region (WWF, 2014). Deforestation concerns are particularly high for soy from Brazil – the largest producer in the region – in biodiversity-sensitive regions like the Amazon rainforest and Cerrado grasslands. Along with other soft commodities like palm oil, paper and beef, soy is increasingly subject to attention as a 'deforestation-risk commodity', with agreements such as the New York Declaration on Forests and the Amsterdam Declarations targeting the reduction (and ultimate elimination) of the use of environmentally destructive products in supply chains (Amsterdam Declaration 2015a, 2015b, Climate Summit, 2014).

The governance of soy

There is an ongoing debate in GVC circles as to where particular agrifood chains 'sit' according to dominant typologies, such as buyer-versus producer-driven and market versus hierarchical chains. Broadly speaking, we can observe that many agrifood chains are 'buyer-driven' because of the presence of dominant retailers like Tesco, Walmart and Carrefour, which are able to use their oligopsonic position as 'gatekeepers' to consumer markets in high-income (and increasingly lower-income countries) to control and coordinate global supply chains. This oligopsonic position is derived partly from high barriers to entry in the form of

scale economies; but it also stems from the intangible assets of these firms linked to brand reputation. According to Ponte and Gibbon (2005), corporate power in the form of brand reputation stems from the ability of these firms to convey complex information to consumers regarding the 'quality' attributes of their products in the form of widely accepted social standards and established codification and certifications processes. From this perspective, the prominence of private standards in the form of codes of conduct, alongside second or third-party certification schemes for specific commodities, is a function of whether or not these GVCs are buyer-driven and consumer facing.

In what follows, we draw mainly (though not exclusively) on data from Brazil and its links to European and UK consumer markets to examine the extent to which the case of soy conforms to these GVC assumptions. Attention within Europe on deforestation activity linked to soy production in regions such as Brazil is high. This can be seen, for example, in the large number of EU-based firms that have signed up to the 2018 'Cerrado Manifesto Statement of Support' (FAIRR, 2018). As indicated, the case of soy challenges the stark dichotomy between buyer- versus producer-driven GVCs due to the fact that powerful players are located at both ends of the chain. At the same time, the 'embedded' character of soy in the food system has meant that consumer-facing firms have been shielded from the externalities of its production and trade to a much larger degree than is the case for comparable commodities like palm oil. Thus, the ambiguities surrounding the distribution of economic power in the soy value chain, coupled with the embedded character of soy in production processes, helps to explain the widely perceived inadequacies of the private certification of 'sustainable soy' – and ongoing and wider political struggles around land, labour and the environment – for more comprehensive and inclusive forms of governance.

Figure 1 provides a stylised representation of the GVC for soy typical of the EU-Latin American connection. Applying Gereffi et al.'s (2005) GVC governance framework, we can describe some soy producers as 'captive' in that they have a limited client base in areas monopolised by single traders (Garrett et al., 2013), while we can describe other producers as 'market-based' because they have greater access to multiple buyers. Amaggi's business model, though, can be seen as an alternative, which comes close to Gereffi et al.'s notion of 'hierarchical' GVCs due to its direct ownership of upstream farms (Amaggi, 2018). Soy GVCs in Latin America show similar levels of diversity when it comes to activities further downstream. Here, producers use a variety of business models and perform different functions in specific segments of the chain, such as the production of animal feed versus sourcing this from independent feed manufacturers, through to supplying meat products direct to overseas retailers. In Brazil, the 'big five' traders (ADM, Amaggi, Bunge, Cargill and Louis Dreyfus), alongside emergent players such as Cofco, dominate the soy landscape (Trase, 2018). Yet, many hundreds of smaller trading firms supply both domestic and international markets in complex trading

networks. Retailers typically source meat products from a handful of meat manufacturers, which are linked back to the lead firm. These firms, which often have multinational operations and represent powerful nodes in the chain, may also source, or supply, to actors (grey boxes, dashed arrows in Figure 1) that sit outside the value chain of the lead trading firm. At each stage of the value chain, there is typically a handful of actors that dominate the processing stage, but the essence of the GVC for soy is the spatially complex distribution of the global supply chain and the complex interdependencies therein.

This complexity means that, whilst the lead trading firm has a large influence in the value chain, a number of other important firms also influence significantly the sourcing and distribution of soy-linked material to the point of consumption. The implications of this complexity are twofold. First, the presence of powerful firms both 'upstream' and 'downstream' complicates the idea of 'drivenness', to the point where the linearity implicit in the buyer-driven model loses much of its relevance for soy. Second, the complex distribution of economic power in the soy value chain draws attention to the constrained position of the retailer compared to the situation within other agricultural or manufacturing GVCs. In common with the value chains for these commodities, retailers are several steps removed and geographically isolated from the production process and therefore from the social or environmental consequences this may have. But the added complication with soy is that the retailer may not possess the power to control or mitigate these effects, if it was inclined to do so. Further, these firms cannot easily access the data on the roles and relationships of different actors, on environmental impacts, or on the effectiveness of policies and actions designed to address those impacts that would be necessary to inform their own private labelling or certification by a third party (Climate Focus, 2016; Gardner et al. 2018).

Brazil-EU linkages

As the world's leading exporter, Brazil shipped some 70 m tonnes of soy in 2015, including 41 m tonnes of direct exports to China and 12 m tonnes of direct exports to the EU (Trase, 2018). From a GVC perspective, this trade is dominated by the 'big five' soy traders that collectively exported 37 m tonnes in 2015, namely, Bunge (11.5 m tonnes), Cargill (8.8 m tonnes), ADM (6.8 m tonnes), Louis Dreyfus (5.1 m tonnes) and Amaggi (4.6 m tonnes). These firms are also commonly involved in the initial processing stages for soy. For example, Cargill, the largest single exporting trader to the UK, operates processing facilities, animal feed manufacturing (also the second largest global animal feed manufacturer, responsible for 17.9 m tonnes of feed in 2016), and animal production activities (Cargill Meats Europe was responsible for 140 m slaughtered heads of chicken and turkey in 2016).

Further along the supply chain for soy, 31 of the world's leading feed manufacturers are based in the EU-28

(Wattagnet, 2018). Within this region (and across the sample of businesses from this source), the top four by production volume (across all feeds, irrespective of soy content) are based in the Netherlands, with the top ten (see Table 1) accounting for 63 per cent of total EU production. The largest UK feed producer in 2016, AB Agri, had a 2.8 per cent market share in Europe (2.2 million tonnes), but is one of only two listed major UK feed producers (2Agriculture Ltd is the second, producing 924,000 tonnes).

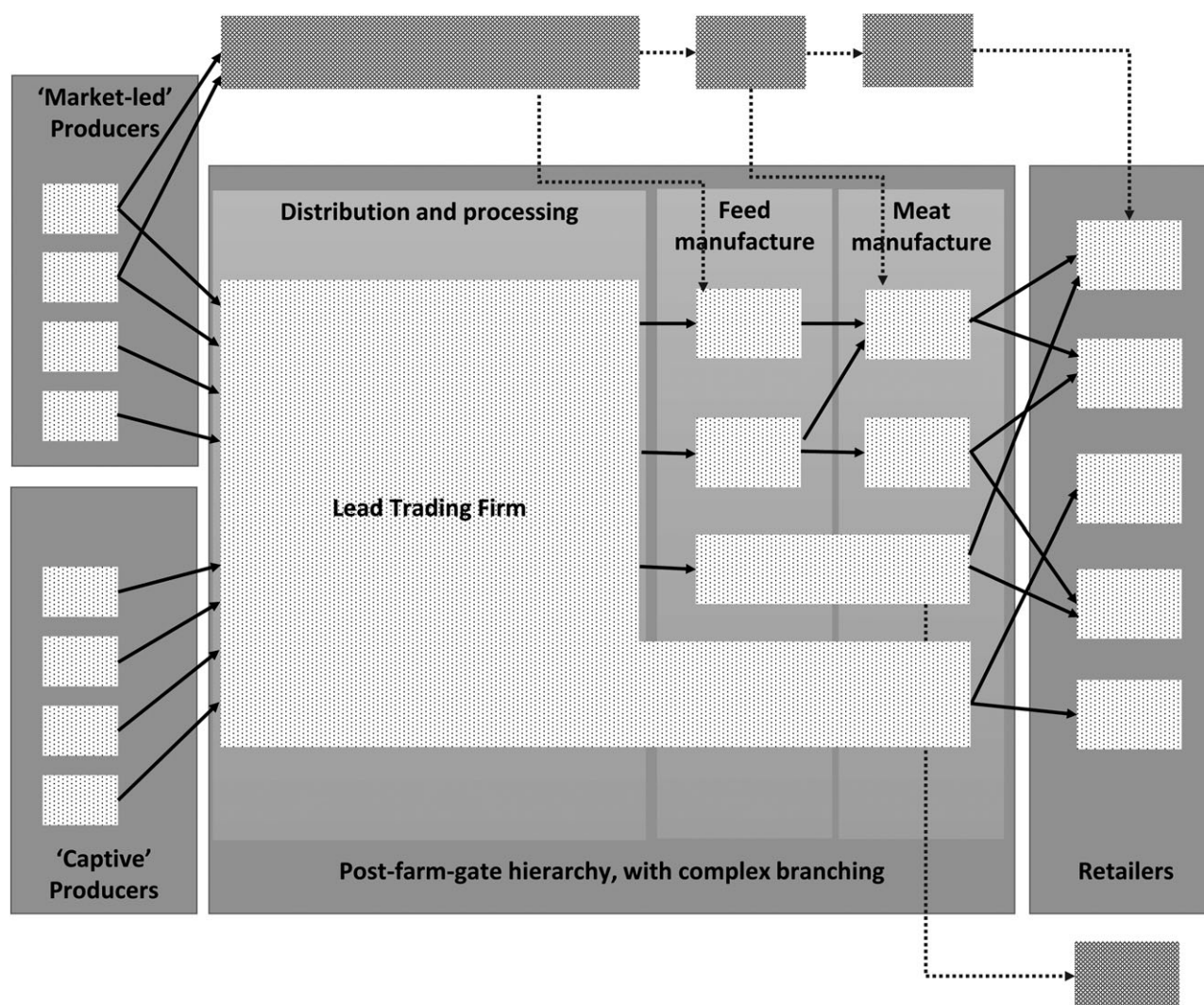
Downstream, soy-linked animal feed is predominantly utilised in the pork and poultry industries. Approximately 88 of the world's leading poultry (chicken and turkey) producers are based in the EU28 (Wattagnet, 2018). Within this region, the top ten producers have a market share of 47.1 per cent (see Table 2). In the UK, four companies dominate production, accounting for 86.5 per cent of market share: 2 Sisters Food Group (317 m heads), Moy Park Ltd (260 m heads), Cargill Meats Europe (140 m heads) and Faccenda Group (100 m heads).

Finally, retail markets across Europe are also typically dominated by a handful of actors. In the UK, four supermarkets account for over 70 per cent of market share (Tesco, 27.9 per cent; Sainsbury's, 16.2 per cent; Asda, 15.6 per cent; Morrisons, 10.6 per cent) (Kantar WorldPanel, 2018). A shared set of meat suppliers (2 Sisters, Moy Park, Cargill, Faccenda) provide these retail outlets with much of their 'own brand' fresh and processed meat (Lang 2014).

Looking upstream from the perspective of the retail outlet or food service provider, there is thus a complex network of potential suppliers involved at various stages in the soy value chain. Whilst a given retailer is likely to be connected to a handful of major meat producers, the subsequent connections to feed suppliers and traders is diffuse, meaning that it is often difficult, in some cases virtually impossible, to trace back to the sources of production. This is even more complex when supply chains are internationally distributed across the various processing stages, as they typically are for soy-linked products. In the UK, for example, the 2 Sisters Food group sources some of its products from its Dutch operations. Overall, whilst the UK sourced approximately 845,000 tonnes of soy from Brazil via direct imports in 2011 (Trase, 2018), the real volume of soy consumed (i.e. including soy consumed indirectly in the form of animal feed) is estimated to be closer to 1.9 m tonnes (out of the UK's estimated global 4.5 m tonne soy 'footprint') (SEI IOTA model; Croft et al., 2018). Whilst the aforementioned multinational traders reside at the core of the bulk of the supply chain transactions associated with this volume of consumption, a number of powerful actors mediate the stages in the value chain, which co-exist in the soy 'ecosystem' (See Figure 1).

Collectively, these actors (along with final consumers) share a large degree of the overall responsibility for any environmental damage associated with soy production. In some cases, these supply chains are highly integrated (e.g. Cargill); in others, different actors operate at each node. From a GVC governance perspective, the key point is that, with the exception of the retailers, none of these firms are easily recognisable 'brands'—a factor that has a significant

Figure 1. A stylised representation of the soy GVC.



bearing of the ability of certified labels to convey product information to consumers. Indeed, because the bulk of soy is consumed indirectly, it is rarely listed as a product ingredient. The case of soy thus raises two critical questions for the GVC governance debate. The first is that the presence of large, dominant but 'brandless' firms in the GVC for soy removes, or at least reduces, the market incentive to sponsor certification. The second is that the embedded character of soy and its omission from product information labels means that these firms, at least until very recently, have been shielded from consumer pressure and possibly boycotts.

Private standards and certification in soy

Recalling Rueda et al.'s (2017) typology discussed earlier, private certification for soy requires some explanation, since it fails a key condition for the emergence of such schemes: namely, brand recognition by consumers and opportunities

for product differentiation on the basis of 'quality' attributes. This explanation rests, in part, on the fact that the two forces that have driven private certification are not directly about soy, but rather wider concerns surrounding the governance of GMOs and, more recently, deforestation. In the case of GMOs, Garrett et al. (2013) argue that Brazil has become an attractive marketplace for EU investment and trade due to its continued production of GMO-free soy. Here, private certification schemes, including Cert-ID and ProTerra, have emerged to assure downstream actors of the absence of GMO material in their supply chains. ProTerra, developed by Cert-ID and Genetic ID (Europe) between 2004 and 2005 (Meyer and Cederberg, 2013), is based on the Basel Criteria for Sustainable Soy Production. It is currently used primarily for soy although it has been designed to be applicable to all agricultural sectors (Lernoud et al., 2017). ProTerra uses a quality management system approach, collecting input from leading members of the food and agricultural industry and public interest

Table 1. Leading feed manufacturers in the EU28 – soy supply chain (Source: Wattagnet, 2018)

Business	Location	Tonnes ('000s)	Market share
ForFarmers N.V.	Netherlands	9259	11.7%
Agrifirm Group	Netherlands	6706	8.5%
De Heus	Netherlands	5950	7.5%
Nutreco	Netherlands	5900	7.5%
DLG Group	Denmark	4500	5.7%
Agrifirm Feed	Netherlands	4250	5.4%
Agravis Raiffeisen	Germany	4060	5.1%
Avril/Sanders	France	3400	4.3%
Veronesi	Italy	3150	4.0%
DTC Deutsche Tiernahrung Cremer	Germany	2800	3.5%

Table 2. Leading poultry producers in the EU28 (Source: Wattagnet, 2018)

Business	Location	Head slaughtered annually	Market share
LDC	France	458.8	6.8%
Plukon Food Group	Netherlands	395.2	5.9%
Gruppo Veronesi	Italy	350	5.2%
PHW Group	Germany	350	5.2%
AIA (Agricola Italiana Alimentare)	Italy	350	5.2%
2 Sisters Food Group	United Kingdom	317	4.7%
Moy Park Ltd.	United Kingdom	260	3.9%
Amadori	Italy	250	3.7%
Indykpol Capital Group	Poland	250	3.7%
Rothkötter Mischfutterwerk GmbH	Germany	190	2.8%

organisations (Cert and Freire, 2011). In terms of requirements, in addition to the exclusion of GMO material, ProTerra standards are designed to prevent the unsustainable use of soil, pesticides and water, and to prevent landowners from converting native forests or other high conservation value areas into cropland (Garrett et al., 2013). The standard requires that all ingredients in the supply chain are inspected, audited, sampled and tested before granting a non-GMO certificate, which means that the certified material is fully segregated from non-GMO/non-certified material.

In the case of deforestation, the other major standard for soy from Brazil centres on the provision of 'responsible' soy. The RTRS certification standards were developed via a 'multi-stakeholder' process spearheaded by WWF and modelled on a similar set of standards for palm oil (RSPO) (Lernoud

et al., 2017; Mier y Terán, 2011). The RTRS comprises a generic set of principles and criteria that can be applied to GMO, non-GMO and organic soy. RTRS certification requires firms to be assessed by an accredited third-party certification body and comply with environmental laws and management criteria regarding restoration, inputs and pollution. Finally, farms are not allowed to convert native forests or other high conservation value areas into cropland (Garrett et al., 2013).

ProTerra and RTRS both aim to contribute to sustainable and responsible soy production practices and thus share similar standards for assessing environmental performance, particularly on requirements for legal compliance, waste and pollution management, labour conditions and gender equity, child labour and community relations. ProTerra and RTRS are also similar in relation to pesticide use (as they prohibit the use of agrochemicals listed in the Stockholm and Rotterdam Conventions) and in relation to greenhouse gas criteria with both schemes targeting the reduction of emissions and increase of carbon sequestration. There are, however, some differences between Proterra and RTRS that directly or indirectly impact their processes and outcomes. One fundamental distinction lies in their governance. While Proterra follows the Basel Criteria principles implemented by Cert-ID, a private company, RTRS follows a 'consensus building' approach with different stakeholder dialogue and engagement. Another significant difference between the two schemes refers to the type of soy produced and how it is sourced. ProTerra does not allow any GMO soy but RTRS accepts all kinds of soy, including GMO. ProTerra certification accepts a maximum contamination limit of 0.1 per cent and RTRS a maximum of 0.9 per cent (Meyer and Cederberg, 2013).

In the case of RTRS, soybeans can be sourced in three ways: through a segregated supply chain, using mass balance accounting (to keep track of how much of their production is certified) or through a certificate-trading platform (to enable buyers to purchase 'credits' from soybean growers with the assurance that overall consumption of RTRS soy does not exceed production). The latter two mechanisms thus do not ensure that soy reaching consumers has been farmed responsibly. Regarding environmental responsibility, the two schemes stipulate different cut-off periods for the use of previously cleared land. ProTerra's cut-off date is 1994 but they accept land that has been cleared up to 2004, if compensatory environmental measures have been undertaken. RTRS has a cut-off date of May 2009, but they have also developed a mapping project for Brazil, designed to reduce the negative impact of soy expansion over more important areas for biodiversity (Meyer and Cederberg, 2013).

Uptake of standards and alternative commitments

According to ProTerra, around 56.1 m tonnes of non-GMO soy was produced globally in 2015, representing 17 per cent of total soy output. Of this, just 5 m tonnes were segregated along the value chain and certified by non-GMO standards, with Brazil accounting for approximately 80 per cent of this

output. Price premiums for certified non-GMO soy fluctuate from \$16 to \$54 per tonne (with ProTerra certification adding a further ~\$4 per tonne, adding 5–10 per cent to the price of soy which is typically \$350–\$600) (Garrett et al., 2013). In comparison, in 2015, approximately 2.2 m tonnes of production were certified under RTRS standards, with 1.4 m tonnes produced in Brazil. The price premium for RTRS soy is significantly lower than that for non-GMO, at around \$1.50 per tonne (Garrett et al., 2013). Globally, RTRS certified soy accounts for less than 1 per cent of the market, which is in contrast to RSPO certification for palm oil, which accounts for around 18 per cent of global markets (Garrett et al., 2016). Whilst Brazil is clearly a key market for both non-GMO and RTRS certified soy, these figures illustrate that, overall the prevailing landscape of production in Brazil is that dominated by GMO production and production that is not certified as responsible.

A small market does exist for responsibly sourced soy, but the fact that most soy is not certified under such standards means that certification is likely to be relatively ineffective in promoting the transition towards sustainable production that the standards are designed to induce. The implication of this is that other forms of corporate governance may be more appropriate. For example, in 2006 the 'Soy Moratorium' was established with the involvement of the Brazilian Association of Vegetable Oil Industries (ABIOVE) and the National Grain Exporters Association (ANEC) as a result of pressure exerted initially from an influential report from GreenPeace, entitled 'Eating up the Amazon', and then associated pressure from NGOs and retailers (Gibbs et al., 2015; Meijer, 2015). The moratorium comprises a voluntary agreement by the soy industry to not purchase soy grown on lands deforested post-2006 in the Brazilian Amazon. Since the agreement, only a small amount of new deforestation for soy has occurred in the Amazon, which is attributed to the involvement of a limited number of actors able to exert significant control, the simplicity of requirements for compliance, streamlined monitoring, and – importantly – simultaneous efforts by the Brazilian government to reduce deforestation and active participation in the process by NGOs and government agencies (Gibbs et al., 2015). Government-level interventions such as Norway's, which in 2008 committed to support a Brazilian government fund with \$1-billion of performance-based investment (dependent on a lowering of deforestation rates) (Nepstad et al., 2014), have helped to promote more stringent national policy development and law enforcement (Boucher et al., 2013; Meijer, 2015). More recently, the New York Declaration on Forests (NYDF) is representative of another high-profile voluntary agreement, which has the involvement of industry, NGO and governmental bodies. Whilst not dedicated solely to soy (rather it covers a basket of commodities linked to deforestation) it has acted as a catalyst for further political engagement (e.g. the Amsterdam Declaration on eliminating deforestation from European commodity supply chains) and associated commitments to support transitions towards the sole use of sustainable soy in supply chains by 2020. More latterly, voluntary commitments such as the Cerrado

Manifesto have seen a multitude of retail and consumer goods manufacturers commit to collaborative engagement with local and international stakeholders, including governments, to halt the destruction of the Cerrado habitat.

Returning to the uptake of certified soy, a key barrier to the mainstreaming of private, 'market-based' certification schemes appears to be a lack of downstream demand from consumers. While groups that 'represent' consumers (i.e. NGOs such as WWF and GreenPeace) have been proactive in both the establishment of certification schemes for soy (or perhaps more accurately, establishing frameworks designed to overcome the issue of deforestation to which soy production is linked), and for other high-profile activities that have put pressure on supply chain actors (and resulted in, for example, the Soy Moratorium), these do not, seemingly, fit the mould of consumer-driven initiatives such as FairTrade cotton, coffee or cocoa, where a clear sustainability price premium and associated 'premium product' perception is adopted by consumers themselves. The price premium attached to certified products means that this model is only financially viable if there is recognition that the financial benefits of sourcing certified soy outweigh the costs; that actors believe the standards are sufficiently robust; and that they feel their own actions will not be undermined by unpunished 'laggards' in the system. Low levels of uptake suggest that market-driven incentives are not sufficiently strong to promote significant uptake. The structure of the supply chain, where soy is typically traded 'in bulk' has promoted dependence on mass balance and credit-based systems of compliance as a 'lower cost' alternative to full segregation, but such models are significantly less robust in their delivery of truly sustainable products. For GMO-free soy, where there is a clear regulatory and consumer 'push' to guarantee compliance, price premiums associated with certification appear warranted, whereas the same demand does not seem to be apparent for sustainability concerns addressed by RTRS. Furthermore, there is clearly a broad marketplace for uncertified soy, meaning incentives for a transition to certified soy are undermined. The fact that soy is a low-visibility commodity, with no requirement for identification on meat labels of the source or type of feed used, does little to promote transparency in the system that might otherwise promote more responsible sourcing behaviours.

If the complex structure of the value chain and lack of demand-side 'push', as we have argued, undermines the proliferation of sustainability standards for soy, what then does this mean for the certification landscape? Multilateral initiatives like the NYDF and Cerrado Manifesto appear to have greater potential to drive the uptake of sustainable soy, which may include that certified under RTRS or ProTerra standards. However, it is likely that – even with these emergent international pressures from governments, retailers and NGOs – a similar set of challenges will still need to be overcome for certification to flourish. The uptake of certified soy will require confidence in the rigour of such standards in preventing biodiversity loss. This is currently unlikely given that their anti-deforestation criteria are relatively ambiguous

and cover native forests and areas of high conservation value, which represent just a portion of potentially important habitat, offering limited protection to environments like the Cerrado (Meijer, 2015). Furthermore, the lack of required segregation by RTRS, and the price premium imposed by this segregated model within ProTerra standards, means that downstream incentives must still be strong if a segregated model of supply is to be developed. This will require greater awareness and consumer 'willingness to pay' in both European markets and, more importantly, in markets such as China that represents a far larger and rapidly expanding slice of Brazilian exports. Markets must work in conjunction with NGO and national governance processes to ensure that such incentives are promoted, retained and transferred to other consumption contexts.

Conclusions

In this article, we have offered a contribution to the GVC governance debate focusing on how the concept has been appropriated by GVC scholars and applied to different cases. We have argued that the dominant questions in most GVC scholarship centre on the generation, control and distribution of economic value. Whilst not dismissing the central importance of these questions, we have cast the net a little wider to consider the transnational politics of what, for want of a better term, can be called the 'sustainability' agenda. To do this, we have focused on the case of soy – a commodity that is produced intensively and traded extensively with acute environmental consequences – and asked two related questions: does soy conform to GVC assumptions about governance? And what form has this taken with respect to environmental sustainability? In answering the first question, we have found soy to be a rather poor fit with existing models. Although recent interventions in the debate (e.g. Lee et al., 2012) have sought to nuance the GVC vocabulary to account for the different forms of economic organization found in agrifood, this only takes us so far. We showed that the case of soy represents a poor fit with existing GVC categories not simply because of the presence of what Lee et al. (2012) refer to as 'bilateral oligopolies' (i.e. powerful firms both 'upstream' and 'downstream'). It is also due to the existence of discrete producer-trader relationships *within* each node in which functionally similar firms perform a variety of different roles according to the specific nature of their business relationships. Further, the particular way that soy is embedded in the food system adds a further layer of complexity to the value chain analysis. While this shields consumer-facing firms, that is, retailers, from the externalities of soy production and trade, it also limits their power to control or mitigate these effects, if they were inclined to do so. Indeed, there is a striking parallel between the analytical challenges that soy poses for researchers seeking to understand the drivers of soy production (and hence deforestation and habitat loss) and the practical difficulties that retailers have in accessing the data necessary to inform their own commitments to ethical sourcing. These factors combined help us to answer our second question, where we found that private

certification – in the form of ProTerra and RTRS – has played a relatively minor (and largely ineffective) role in the governance of soy in comparison to, for example, the Soy Moratorium or recent multilateral schemes like the NYDF and the Cerrado Manifesto. This is clearly a provisional judgement as it is obvious that a more thorough comparative assessment is needed – both of soy in general and of its governance more specifically. In the meantime, we hope our analysis has succeeded in making a not insignificant contribution to the ongoing GVC governance debate – and, perhaps, the first step towards a wider, more inclusive and fully interdisciplinary research agenda.

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